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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/965,764	09/28/2001	Robert W. Byren	PD-00W089	2963

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EXAMINER

LEE, PATRICK J

ART UNIT

PAPER NUMBER

2878

DATE MAILED: 07/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/965,764

Applicant(s)

BYREN ET AL.

Examiner

Patrick J. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

2. The drawings are objected to because in figure 5, the label for optical phase array 1 is unclear. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

On line 21 of page 6, "grating-rhomb" should be capitalized.

On line 19 of page 13, "Power Amplifiers 480" should read "Power Amplifiers 470" in order to correctly refer to figure 4.

Appropriate correction is required.

Claim Objections

4. Claim 38 recites the limitation "the second means" in claim 38. There is insufficient antecedent basis for this limitation in the claim.

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5. Claims 17 & 38 are objected to because of the following informalities: Claims 17 & 38 both disclose "a third beam", but do not disclose a second beam. In addition, it is vague as to whether there is any difference in functionality between the second means for correcting for aberrations and the fourth mean for applying the correction. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7, 17, 35-36, & 38 are rejected under 35 U.S.C. 102(e) as being anticipated by O'Meara 3,764,213.

With respect to claims 1-4, 17, 35-36, & 38, O'Meara discloses a system with a phase controlled adaptive array for adaptive compensation of beams due to adverse effects of atmosphere (see column 1, lines 40-43, 52-57). The system comprises of laser source (10), telescope (32), detectors (48 126), phase shifters (30), laser power amplifier (102), adaptive control processor (150), and beamsplitters (14, 104). Telescope (32) serves as a first means by receiving a first beam of light reflected from a target. Detector (48) serves as a second means for detecting aberrations by producing a signal indicative of the polarity and magnitude of the phase error (see column 6, lines

3-10). Adaptive control processor (150) serves as part of the means for ascertaining a correction and sending an appropriate signal to a phase shifter array (30). Phase shifter array (30) serves as a means for compensation of phase disturbances within a beam coming from laser source (10) (see column 2, lines 43-45). Laser power amplifier (102) serves as a means for amplifying a modulated beam from phase shifter array (30) to produce an output beam.

With respect to claims 5-7, detector (48) serves as a wavefront error sensor, which sends a signal to adaptive control processor (150) for providing a correction signal to phase shifter array (30).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Meara et al 5,396,364 in view of Komine 6,404,784.

With respect to claims 1-2 & 4, O'Meara et al disclose a light modulator apparatus comprising of laser (8), multiple beam splitters (BS1, BS2, BS3), multiple filters (F1, F2), a lenslet array (16), a mirror (18), and a spatial light modulator (14). Beamsplitter (BS1) serves as a first means for receiving radiation, while spatial light modulator (SLM) (14) serves as both the second and third means as it can detect the aberrations in the first beam and generate a second beam with the corrections of the wavefront. Spatial light modulator as the adaptive optics system is capable of detecting and compensating for the target beam aberrations (see column 4, lines 37-41). A first beam is received at the beamsplitters (BS1) and sent to the SLM (14) and reflected without correction when the system originally starts operation (see column 4, lines 44-49). The beam is reflected by beam splitters (BS2, BS3), and mirror (24) and combined with a reference laser beam (26) to form a beam (28) detected by the photocathode (32) of SLM (14). Photocathode (32) serves as the second means for aberration detection. A signal from the photocathode (32) is applied to the grid (36) and microchannel plate amplifier (34) and sent to the charge transfer plate (38). Charge transfer plate (38) with the conductive pins (42) serves as the compensation means for phase distortion along with deformable mirror (46). The combination of the charge transfer plate (38) and deformable mirror (46) serve as the third means responsive to the photocathode (32) to apply the corrections. The input beam (12) that is corrected by the SLM (14) reflects back to the beam splitter (BS1) and through beam splitter (BS2) to plane mirror (18).

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Plane mirror (18) then reflects the focused beam back to beam splitter (BS2) to produce output beam (20). The device taught by O'Meara et al does not disclose a device for amplification of a light beam to produce an output light beam, but such is known and taught by Komine et al in a device for a laser system. Komine teaches the use of amplifiers (40, 42, 44) to provide a scalable high average power level output light beam (see column 4, lines 61-65). To modify the teachings of O'Meara by those of Komine would have been obvious as the output beam could be intensified to overcome any wavefront aberrations.

With respect to claim 3, the use of the first means as a telescope is not explicitly stated, but such is known and would have been obvious in order to ensure that light is accurately received by the system.

With respect to claims 5-6, O'Meara et al does not explicitly state the use of a wavefront error sensor, but Komine discloses such with a wavefront sensor/feedback controller (121). To modify the teachings of O'Meara et al accordingly would have been a mere matter of obvious design choice as the modification also allows the system to compensate for the aberrations.

With respect to claims 7, SLM (14) serves as an optical phased array.

With respect to claim 8, O'Meara discloses the use of a reference beam (26) to illuminate the SLM (14) and provide a corrective signal.

10. Claims 17, 23-25, 35-36, & 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Meara et al 5,396,364.

With respect to claim 17, 35-36, & 38, O'Meara et al discloses a system comprising of a beam splitter (BS1) for receiving a target return from a target, a SLM (14) as a second and third and fourth means for correcting for, ascertaining, and applying the correction to a beam. Photocathode (32) serves as the third means for aberration detection. A signal from the photocathode (32) is applied to the grid (36) and microchannel plate amplifier (34) and sent to the charge transfer plate (38). Charge transfer plate (38) with the conductive pins (42) serves as the compensation means for phase distortion along with deformable mirror (46). The combination of the charge transfer plate (38) and deformable mirror (46) serve as the second and fourth means responsive to the photocathode (32) to apply the corrections.

With respect to claim 23, O'Meara et al discloses beamsplitters (BS2) disposed between the first beam splitter (BS1) and SLM (14).

With respect to claim 24, the master oscillator is not explicitly disclosed by O'Meara et al, but such is known and would have been obvious as being capable of producing a reference beam.

With respect to claim 25, the correction signal from SLM (14) off of beam splitter (BS1) and to the backside of beam splitter (BS2) as a back surface read signal.

11. Claims 8-12, 18-21, & 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Meara 3,764,213 in view of Byren 4,798,462.

O'Meara discloses the system as described above.

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With respect to claim 8, O'Meara does not disclose the illumination of the phased array with a reference beam, but such is known and would have been obvious in order to monitor the performance of the device.

With respect to claims 9-12, 18-21, & 37, O'Meara does not disclose the use of conjugators. However, such is known and taught by Byren. Byren teaches a system in which a phase conjugation unit (22) is used to correct for optical distortions introduced into the light by the optics and laser amplifier. To modify the teachings of O'Meara with those of Byren would have been obvious in order to augment to the corrective abilities of the device. While the combination of teachings does not disclose the positioning of the conjugators with respect to certain optical elements, such would have been a mere matter of obvious design choice to monitor the performance of optical elements in the system.

12. Claim 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Meara 3,764,213 in view of Shen et al 5,198,653.

With respect to claim 13-14, O'Meara teaches the system as described above. However, O'Meara does not teach the use of a Grating-Rhomb. Such is known and taught by Shen et al in a device for wavefront sensing. Shen teaches the use of holographic optical element (HOE) diffraction gratings (50) in the optical path for sampling the wavefront at a number of locations and directing samples to a wavefront sensor. To modify O'Meara accordingly would have been obvious in order to further detect for any aberrations caused by the optical elements.

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With respect to claim 15, O'Meara discloses a beam splitter (14, 104) as an aperture-sharing element disposed in the optical path of both the first and second beams.

With respect to claim 16, O'Meara discloses detectors (48, 126) for detection of aberrations in the aperture sharing elements.

13. Claims 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Meara et al 5,396,364 in view of Byren 4,798,462.

With respect to claim 26, O'Meara et al discloses a system in accordance to that of claim 25. The corrected signal from SLM (14) reflects off of beam splitter (BS1) and to a surface of beam splitter (BS2) as an outcoupling element. A signal is transferred through to lens array (16) and mirror (18).

With respect to claim 27, O'Meara et al does not disclose a use of a first phase conjugate mirror. However, such is known and taught by Byren 4,798,462. Byren teaches the use of a phase conjugating mirror (22) and a power amplifier (21). To modify the teachings of O'Meara et al by those of Byren would have been obvious in order to improve the corrective abilities of the device and to produce an output signal.

With respect to claims 28-29, a second phase conjugate mirror is not disclosed but such would have been obvious in order to ensure that the optical elements are operating properly.

With respect to claims 30-31, Byren teaches the use of amplifier (22).

With respect to claim 32, beam splitter (BS2) serves as an aperture-sharing element.

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Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Evtuhov 4,321,550 discloses a phase conjugate corrective system.

Stappaerts 5,378,888 discloses a target tracking system involving the use of lasers.

Klein et al 5,717,516 disclose a laser power correction system.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J. Lee whose telephone number is (703) 305-3871. The examiner can normally be reached on Monday through Friday, 8:00 am to 5:30 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (703) 308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-9558 for regular communications and (703) 306-5511 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

PJL

June 11, 2003

Patrick J. Lee
Examiner
Art Unit 2878


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